Karolinska Institutet

Department of Clinical Neuroscience

Polycystic ovary syndrome

Studies of affective symptoms in association with sex steroids and evaluation of electroacupuncture and physical exercise

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a common heterogeneous condition in women of reproductive age, relating to both physical and mental health. Thoughts on primary pathological origins shift from the ovary to the adrenal gland. Insulin signaling pathways and sympathetic nerve activity are thought to be involved. PCOS features include signs of high androgen concentrations and oligo/amenorrhea. Affective symptoms such as depression and anxiety are prevalent among women with the syndrome and have been associated with body mass index (BMI). PCOS interventions are symptom-oriented and should include physical exercise as part of lifestyle management. Effective pharmacological interventions have side-effects to be taken in consideration. Previous studies suggest electroacupunture (EA) to modulate features commonly observed in women with PCOS. The general aims of this thesis were to explore self-reported depression and anxiety-related symptoms in women with PCOS; and to evaluate low-frequency EA and physical exercise on muscle sympathetic nerve activity (MSNA), biochemical hyperandrogenism and oligo/amenorrhea.

Study I investigated depression and anxiety-related symptoms in women with PCOS and noted several anxiety symptoms to distinguish women with PCOS from controls matched on age, body weight and BMI. Symptoms of worry, phobias and sleep disturbances were overrepresented among women with PCOS and may be an indication of an increased arousal.

Study II explored associations between depression and anxiety symptoms, and estrogens, sex steroid precursors, androgens, glucuronidated androgen metabolites, sex hormone-binding globulin (SHBG) and insulin sensitivity in drug-naïve women with PCOS. Women with depression-related symptoms had lower testosterone (T), free testosterone (FT) and androstane-3α 17β-diol-3glucuronide (3G). There were inverse associations between circulating FT, 3G and symptoms of depression.

Study III aimed to evaluate low-frequency EA and physical exercise on MSNA in women with PCOS. Twenty women with PCOS were allocated to low-frequency EA, physical exercise, or no intervention. From baseline to week 16, MSNA burst frequency decreased by -39.4% for low-frequency EA; -39.0 % for physical exercise; and -8.7% for no intervention.

Study IV investigated if low-frequency EA would decrease hyperandrogenism and improve oligo/amenorrhea more effectively than physical exercise or no active intervention in women with PCOS. Eighty four women with PCOS were randomized to 16 weeks of low-frequency EA, physical exercise, or no intervention. Circulating T, androsterone glucuronide (ADT-G) and 3G decreased from baseline measurements to week 16 for low-frequency EA compared to physical exercise. Circulating T, FT, estrone-sulfate (E1-S), ADT-G, 3G and androstane-3α 17β-diol-17glucuronide (17G) decreased from baseline measurements to week 16 for low-frequency EA compared to no intervention. The monthly menstrual bleeding frequency increased for low-frequency EA compared to physical exercise and no intervention from baseline measurements to week 16.

Conclusions: This thesis supports the effects of low-frequency EA and physical exercise to be partly mediated via the sympathetic nervous system. Low-frequency EA may be a complement for treatment of hyperandrogenism in women with PCOS. With few minor adverse events of short duration for repeated low-frequency EA and no adverse events for physical exercise, a combination of low-frequency EA and physical exercise is recommended for treatment of oligo/amenorrhea in women with PCOS. With an unmet need for assessment and treatment of affective symptoms in women with PCOS further studies are warranted.